Towards Personalized Federated Learning

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Abstract

In parallel with the rapid adoption of artificial intelligence (AI) empowered by advances in AI research, there has been growing awareness and concerns of data privacy. Recent significant developments in the data regulation landscape have prompted a seismic shift in interest toward privacy-preserving AI. This has contributed to the popularity of Federated Learning (FL), the leading paradigm for the training of machine learning models on data silos in a privacy-preserving manner. In this survey, we explore the domain of personalized FL (PFL) to address the fundamental challenges of FL on heterogeneous data, a universal characteristic inherent in all real-world datasets. We analyze the key motivations for PFL and present a unique taxonomy of PFL techniques categorized according to the key challenges and personalization strategies in PFL. We highlight their key ideas, challenges, opportunities, and envision promising future trajectories of research toward a new PFL architectural design, realistic PFL benchmarking, and trustworthy PFL approaches.